

### III. REMARKS

This document is being submitted in response to the Office Action dated June 17, 2004. Claims 1-20 are pending in this application and claims 1-20 currently stand as rejected. Claims 1, 9, and 18 are independent claims. Claims 2-8 depend from claim 1, claims 10-17 depend from claim 9, and claims 19-20 depend from claim 18. In light of the remarks made herein, the Applicant respectfully requests reconsideration of the claims.

#### Drawings

In the first Office Action, the Patent Office objected to certain informalities in the drawings as originally filed. Accordingly, the Applicant submits herewith a set of formal drawings that address the issues identified by the Patent Office. The drawings do not include substantive amendments.

#### Claim Objections

In the first Office Action, the Patent Office objected to claim 14 because the Applicant used the language “at least one of...” followed by the word “and,” and indicated that the word “or” be substituted for the word “and.” The Applicant respectfully traverses this objection and asserts that the phraseology used by the Applicant is grammatically correct and legally acceptable because it avoids the use of the disjunctive and potentially vague “or” in the claim.

#### 35 U.S.C. § 103(a)

According to the Office Action, claims 1-20 stand as rejected under 35 U.S.C. 103(a) as being unpatentable over a printed publication by Curtner et al. titled “Simulation-Based Features of the Compressed Air System Description Tool,, XCEED”, in view of U.S. Patent 6,036,449 issued to Nishar et al., and further in view of U.S. Patent No. 6,477,518 issued to Li et al. The Applicant respectfully traverses the Patent Office’s rejection of claim 1-20 for the reasons discussed below.

MPEP 2142 provides that to establish a *prima facie* case of obviousness, three basic criteria must be met: (i) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine the teachings; (ii) there must be a reasonable expectation of success;

and (iii) the prior art reference (or references when combined) must teach or suggest all of the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and must not be based on the Applicant's disclosure. Furthermore, MPEP 2143 provides that the mere fact that reference can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. Finally, MPEP 2141 provides that when an Examiner is applying 35 U.S.C. 103, the references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention. Thus, the Applicant traverses the Patent Office's rejection of claims 1-20 because (i) the Curtner reference is not an enabling disclosure; (ii) there is no reasonable expectation of success; (iii) the cited references collectively do not teach all of the claim limitations; and (iv) the Patent Office has clearly used hindsight in the identification of the cited references for the purpose of finding the claimed invention obvious under 35 U.S.C. 103(a).

#### The Curtner Reference (Non-Patent Reference)

Although no identifying indicia is found on the face of the Curtner reference as provided by the Patent Office, this document was apparently published in a peer-reviewed journal, trade publication, or the like in 1997. The reference discusses in general, largely non-specific terms, a piece of software ostensibly for use with compressed air systems utilized at building and manufacturing sites or facilities. Automotive applications are not discussed. While the Curtner reference includes a general discussion of the software's functionality, the reference includes little, if any, specific discussion of the system architecture, operating parameters, specific data inputs and outputs, data flow, calculations, and/or modeling capability of the software (see, for example, FIGS 2 and 3A-B of the Applicant's disclosure). Essentially, the reference appears to discuss, in almost conceptual terms, a piece of software that will have certain desired functions potentially useful for retrofitting certain existing systems. Given the lack of specific information found in this reference it is difficult, if not impossible, to ascertain whether or not an enabled disclosure exists within the discussion of desired results.

#### The Nishar Reference ( U.S. Pat. No 6,036,449)

The Nishar reference describes a system for controlling a vehicle's air compressor system, wherein the system includes an air compressor for providing compressed air to air

powered devices on the vehicle, a sensor for sensing pressure of a reservoir containing compressed air and generating a signal indicative of the pressure, and a control device for activating the air compressor when the signal generated by the sensor drops below a predetermined threshold value, corresponding to a predetermined threshold pressure, or when energy is available to run the air compressor. The system for controlling an air compressor includes the steps of sensing a pressure of a reservoir containing compressed air supplied by an air compressor, generating a signal indicative of the pressure and transmitting the signal to a control unit for controlling the air compressor. Thus, in essence, Nishar describes a reactive, data-driven, on-board control system that functions when the air compressor system experiences certain internal operating conditions.

#### The Li Reference ( U.S. Pat. No 6,477,518)

The Li reference describes a method of cost and weight estimation of an HVAC air-handling assembly for a climate control system on a vehicle. The method includes the steps of selecting a parametric model of the HVAC air-handling assembly design using a knowledge-based engineering library stored in a memory of a computer system and selecting a component part from the model of the HVAC air-handling assembly. The method also includes the steps of determining a cost estimate of the component part using the knowledge-based engineering library and using a summation of the component part cost as the cost estimate of the HVAC air-handling assembly. Essentially, Li describes a design system for use with the type of HVAC systems installed in vehicles.

#### The Claimed Invention

The Applicant's claimed invention is directed to a computer-based method of designing a vehicle's compressed air system based on simulated operation of the system with pre-identified components under predefined operating conditions.

In independent claim 1, the Applicant claims a method of designing a vehicle air system comprising: (a) using a computer to simulate operation of a proposed vehicle air system over a time period, the proposed vehicle air system comprising an air compressor and a pneumatically operable device; (b) using the computer to calculate a duty cycle of the air compressor over the time period; and (c) using the computer to output the duty cycle of the compressor.

In independent claim 9, the Applicant claims a method for predicting performance of a vehicle air system comprising: (a) inputting into a computer data that simulate a proposed vehicle air system, including: (i) data that describe a simulated air compressor of the proposed vehicle air system; and, (ii) data that describe a simulated pneumatically operable device of the proposed vehicle air system; (b) using the computer to simulate operation of the proposed vehicle air system over a simulation time period, the simulation operation including: (i) selectively simulating exhaustion of air from the proposed vehicle air system in response to simulated operation of the pneumatically operable device; and, (ii) selectively simulating addition of air to the proposed vehicle air system in response to simulated operation of the air compressor; and, (c) outputting data from the computer that describe the simulated operation of the proposed vehicle air system.

In independent claim 18, the Applicant claims a method for predicting vehicle air system performance comprising: (a) inputting data that describe a proposed vehicle air system including at least an air compressor and at least one pneumatically operable device; (b) receiving input data related to a capacity of the proposed air compressor to supply air to the proposed vehicle air system; (c) receiving input data related to a cut-in pressure of the proposed vehicle air system below which the proposed compressor is considered operative to add air to the proposed vehicle air system; (d) receiving input data related to a cut-out pressure of the proposed vehicle air system above which operation of the proposed compressor to add air to the proposed vehicle air system is considered terminated; (e) receiving input data related to a usage rate at which the at least one pneumatically operable device depletes air from the proposed vehicle air system when the pneumatically operable device is considered to be in use; (f) receiving input data related to a frequency of operation of the pneumatically operable device; (g) determining a period of operation for the proposed vehicle air system; (h) simulating the operation of the proposed vehicle air system over the period of operation by: (i) calculating data that represent air depleted from the proposed vehicle air system based upon the usage rate and frequency of operation of the at least one pneumatically operable device; and (ii) calculating data that represent air added to the proposed vehicle air system by the proposed air compressor based upon the cut-in and cut-out pressures; (i) recording data that represent a duration of time of the period of operation that the air compressor is considering to be adding air to the proposed vehicle air system; and (j)

calculating data that describe a duty cycle of the proposed air compressor, the duty cycle related to a percentage of time the compressor is considered to be operated during the period of operation.

Applicant's Claimed Invention is Not Obvious in View of the Cited References.

As stated above, the Applicant traverses the Patent Office's rejection of claims 1-20 because (i) the Curtner reference is not an enabling disclosure; (ii) there is no reasonable expectation of success; (iii) the cited references collectively do not teach all of the claim limitations; and (iv) the Patent Office has clearly used hindsight in the identification of the cited references for the purpose of finding the claimed invention obvious under 35 U.S.C. 103(a).

For a legitimate finding of obviousness, there must be a reasonable expectation of success when the references are combined. Even if the Curtner reference included sufficient enabling detail, which it does not, inputting data derived from the sensor in Nishar and the library of Li into the software tool of Curtner would not result in an effective modeling/design method for compressed air systems used in vehicles. Nishar and Li do not provide the type of input data and parametric system information required to both simulate the operation of a compressed air system and predict the system's performance based on the simulation. The data gathered by the sensor of Nishar is limited to certain internal operating conditions, and the data utilized by Li relates to HVAC systems and not pneumatic systems. The software tool of Curtner is poorly characterized and incompletely described, thus it is impossible to discern from the references how the information used in Nishar and Li could be entered into the software tool of Curtner to arrive at the method claimed by the Applicant in claims 1, 9, and 18. Thus, the Applicant argues that claims 1, 9, and 18 are not obvious in view of the cited references because there is no reasonable expectation of success as required by MPEP 2142.

A legitimate finding of obviousness also requires that the cited references teach all of the claim limitations. Clearly, none of the cited reference, either alone or in combination, includes all of the limitations claimed by the Applicant in claims 1, 9 and 18. For example, none of the references specifically discusses *calculating* (as opposed to simply regulating) the air compressor's duty cycle over a predefined period of time based on a simulation of the vehicle's air system (see claim 1). Also, none of the cited references teaches the method steps of

selectively simulating exhaustion of air from the proposed vehicle air system in response to simulated operation of the pneumatically operable device, and selectively simulating addition of air to the proposed vehicle air system in response to simulated operation of the air compressor (see claim 9). Furthermore, none of cited references teaches the method steps of simulating operation of the proposed vehicle air system over the period of operation by: (i) calculating data that represent air depleted from the proposed vehicle air system based upon the usage rate and frequency of operation of the at least one pneumatically operable device; and, (ii) calculating data that represent air added to the proposed vehicle air system by the proposed air compressor based upon the cut-in and cut-out pressures (see claim 18). Thus, claims 1, 9, and 18 are not obvious in view of the cited references because they do not teach all of the claim limitations as required by MPEP 2142.

Finally, the Applicant argues that the Patent Office has clearly used hindsight in the identification of the cited references for the purpose of finding the claimed invention obvious under 35 U.S.C. 103(a). It is apparent that the Patent Office used the Applicant's claims as a template for identifying patent and non-patent references that have only marginal relevance to the claimed invention. Curtner makes no mention of automotive applications, Nishar is not directed to system modeling and design, and Li does not relate to air compressors and pneumatic devices operated by compressed air. Thus, without the Applicant's claims as a blueprint, there would be no motivation or suggestion to combine the teachings of these references to arrive at the claimed invention. It is well established in patent law that the use of hindsight in the selection of references that support a case of obviousness is prohibited. Therefore, the Applicant argues that the combination of the reference cited by the Examiner is based, impermissibly, on hindsight and not on any objective motivation or suggestion to combine the teachings of the references. The Applicant, therefore, argues that claim 1, 9, and 18 are not obvious in view of the cited references.

Claims 2-8 depend from claim 1, claims 10-17 depend from claim 9, and claims 19-20 depend from claim 18. Because, based on the arguments presented above, claims 1, 9, and 18 are believed to define patentably over the cited references, the Applicant asserts that further discussion of these dependent claims is unnecessary because they are also believed to define patentably over the cited references.

Conclusion

For the reasons set forth herein, this application is believed to be in condition for allowance, as the claims are believed to define patentably over the relevant prior art. Favorable consideration of this application is respectfully requested.

Respectfully submitted,

Date: 10/18/2004

Courtney J. Miller

Courtney J. Miller  
Attorney for Applicant  
Reg. No. 45,366  
Calfee, Halter & Griswold LLP  
1100 Fifth Third Center  
21 East State Street  
Columbus, Ohio 43215  
(614) 621-7015